STATEMENT OF WORK
REMEDIAL INVESTIGATION AND FEASIBILITY STUDY
ANNISTON PCB SITE
ANNISTON, ALABAMA

INTRODUCTION

The purpose of this remedial investigation/feasibility study (RI/FS) is to investigate the nature and extent of contamination at the Anniston PCB Site and develop and evaluate potential remedial alternatives. The RI and FS are interactive and may be conducted concurrently so that the data collected in the RI influences the development of remedial alternatives in the FS, which in turn affects the data needs and the scope of treatability studies.

Defendants will conduct this RI/FS and will produce draft RI and FS reports that are in accordance with this Statement of Work, the "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA"(U.S. EPA, Office of Emergency and Remedial Response, October 1988), and any other guidance that EPA uses in conducting a RI/FS (a list of the primary guidance is attached), as well as any additional requirements in the Consent Decree. The RI/FS Guidance describes the report format and the required report content. Defendants will furnish all necessary personnel, materials, and services needed, or incidental to, performing the RI/FS, except as otherwise specified in the Consent Decree.

At the completion of the RI/FS, EPA will be responsible for the selection of a Site remedy and will document this selection in a Record of Decision (ROD). The remedial action alternative selected by EPA will meet the cleanup standards specified in CERCLA Section 121. That is, the selected remedial action will be protective of human health and the environment, will be in compliance with, or include a waiver of, applicable or relevant and appropriate requirements of other laws, will be cost-effective, will utilize permanent solutions and alternative treatment technologies or resource recovery technologies, to the maximum extent practicable, and will address the statutory preference for treatment as a principal element. The final RI/FS report, as adopted by EPA, with the Administrative Record, will form the basis for the selection of the Site's remedy and will provide the information necessary to support the development of the ROD.

The RI/FS investigation will take into account the extensive amount of data that have been collected pursuant to the Administrative Order on Consent between the Defendants and EPA, effective date October 5, 2001 (hereinafter Site Removal Order), and the RCRA Facility Investigation (RFI) being completed pursuant to Defendants' RCRA Permit.

As specified in CERCLA Section 104(a)(1), as amended by SARA, EPA will provide oversight of the Defendants' activities throughout the RI/FS. The Defendants will support EPA's initiation and conduct of activities related to the implementation of oversight activities.

TASK 1 - SCOPING (RI/FS Guidance, Chapter 2)

Scoping is the initial planning process of the RI/FS. During this time, the Site-specific objectives of the RI/FS, including the preliminary remediation goals (PRGs), are determined by Defendants subject to approval by EPA. Scoping is continued, repeated as necessary, and refined throughout the RI/FS process.

In addition to developing the Site specific objectives of the RI/FS, EPA and Defendants will determine a general management approach for the Site.

Consistent with the general management approach, the specific project scope will be planned by Defendants and EPA. Defendants will document the specific project scope in a work plan. Because the work required to perform a RI/FS is not fully known at the onset, and is phased in accordance with a Site's complexity and the amount of available information, it may be necessary to modify the Work Plan during the RI/FS to satisfy the objectives of the study.

The Site objectives for the Anniston PCB Site located in Calhoun County in the State of Alabama have been determined preliminarily, based on available information, to be the following:

l. Review of existing information pertaining to the Site. This includes a review of Work Plans and the associated data generated during the Site Removal Action, work plans and associated data generated during the Defendants' RFI being conducted under its RCRA permit, EPA Preremedial Reports, EPA's Environmental Photographic Interpretation Center photos, the Preliminary Natural Resources Survey, other reports from local, State and Federal agencies, court records, information from local businesses such as local well drillers and waste haulers and generators, facility records, and information from facility owners and employees and nearby citizens.

2. Review of relevant guidance (see attached references) to understand the remedial process. This information shall be used in performing the RI/FS and preparing all deliverables under this SOW.

3. Identification of all Federal and State applicable or relevant and appropriate requirements (ARARs).

4. Determination of the nature and lateral and vertical extent of contamination (waste types, concentrations and distributions) for all affected media including air, ground water, soil, surface water, sediment, and biota, etc.

5. Performance of a well survey within a one mile radius of the Site including determining water uses, well construction methods used, the number and age of users, and the volume and rate of water usage.

6. Identification and screening of potential treatment technologies along with containment/disposal requirements for residuals or untreated wastes.

7. Assembly of technologies into a minimum of three Remedial Action Alternatives (i.e., no action, containment, and treatment) and screening of the alternatives.

8. Performance of bench or pilot Treatability Studies as necessary.

9. Detailed analysis of Remedial Action Alternatives.

10. Sample collection/data analysis of the information necessary to conduct an Ecological Risk Assessment. These tasks are outlined in Supplemental Guidance to RAGS; Region 4 Bulletins-Ecological Risk Assessment (November 1995) and the "Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments."

11. Possible performance of a cultural resources survey to determine if the Site has any archaeological or historic value. The need for conducting a cultural resources survey must be evaluated during the project planning stage of the RI/FS, and if EPA determines that a cultural resources survey is necessary, the strategy for developing the cultural resources survey must be included in the Remedial Investigation Work Plan.

The Site Management Strategy for the Site includes the following:

1. A complete investigation of the Site including any and all off-Site contamination which may have been caused by contaminants originating from the Site.

2. Use of the RI to identify any other Potentially Responsible Parties that may be involved.

3. An initial Work Plan that must incorporate the existing data gained from the Site Removal Action and Defendants' RFI, and initial evaluation of the Site as a whole.

4. Interim remedial measures which may be required.

5. EPA oversight of the Defendants' conduct of the work to ensure compliance with applicable laws, regulations, and guidance and to ensure that the work proceeds in a timely fashion.

6. Defendants' preparation of the Baseline Risk Assessment which shall consist of a Human Health Risk Assessment and an Ecological Risk Assessment.

7. EPA management of the remedy selection and Record of Decision phase with input from the State Agencies, Natural Resource Trustees, and the public.

When scoping the specific aspects of a project, the Defendants must meet with EPA to discuss all project planning decisions and special concerns associated with the Site. Defendants shall perform the following activities as a function of the project planning process.

A. Site Background (2.2)

Defendants will gather and analyze the existing Site background information to assist in planning the scope of the RI/FS.

1. Collect and analyze existing data and document the need for additional data (2.2.2; 2.2.6; 2.2.7)

Before planning RI/FS activities, all existing Site data will be thoroughly compiled and reviewed by the Defendants. Specifically, this will include presently available data relating to the varieties and quantities of hazardous substances at the Site, and past disposal practices. This will also include results from any previous sampling events that may have been conducted. The Defendants will refer to Table 2-1 of the RI/FS Guidance for a comprehensive list of data collection information sources. This information will be utilized in determining additional data needed to characterize the Site, better define potential applicable or relevant and appropriate requirements (ARARs), and develop a range of preliminarily identified remedial alternatives. Data Quality Objectives (DQOs) will be established subject to EPA approval which specify the usefulness of existing data. Decisions on the necessary data and DQOs will be made by EPA.

B. Project Planning (2.2)

Once the Defendants have collected and analyzed existing data and conducted a Site visit, the specific project scope will be planned. Project planning activities include those tasks described below as well as identifying data needs, preparing a Phase I Conceptual Site Model, developing a work plan, designing a data collection program, and identifying health and safety protocols. The Defendants will meet with EPA regarding the following activities and before the drafting of the scoping deliverables below. These tasks are described in Section C of this task since they result in the development of specific required deliverables.

1. Refine and document preliminary remedial action objectives and alternatives (2.2.3)

Once existing Site information has been analyzed and an understanding of the potential Site risks has been determined by Defendants subject to approval by EPA, Defendants will review and, if necessary, refine the remedial action objectives that have been approved by EPA for each actually or potentially contaminated medium. The revised remedial action objectives will be documented in a technical memorandum and subject to EPA approval. The Defendants will then identify a preliminary range of broadly defined potential remedial action alternatives and associated technologies. The range of potential alternatives should encompass where appropriate, alternatives in which treatment significantly reduces the toxicity, mobility, or volume of the waste; alternatives that involve containment with little or no treatment; removal; and a no-action alternative.

2. Document the need for treatability studies (2.2.4)

Treatability studies will be required except where the Defendants can demonstrate to EPA's satisfaction that they are not needed. Where treatability studies are needed, initial treatability testing activities (such as research and study design) will be planned to occur concurrently with Site characterization activities (see Tasks 3 and 5).

3. Begin preliminary identification of potential ARARs (2.2.5)

Defendants will conduct a preliminary identification of potential state and federal ARARs (chemical-specific, location-specific and action-specific) to assist in the refinement of remedial action objectives, and the initial identification of remedial alternatives and ARARs associated with particular actions. ARAR identification will continue as Site conditions, contaminants, and remedial action alternatives are better defined.

C. Scoping Deliverables (2.3)

At the conclusion of the project planning phase, the Defendants will submit a Phase I Conceptual Site Model Report. Following EPA approval of this report, an RI/FS work plan, a sampling and analysis plan (SAP), and a Site health and safety plan will be prepared and submitted by the Defendants. The RI/FS Work Plan and SAP must be reviewed and approved by EPA prior to the initiation of field activities.

1. Phase I Conceptual Site Model Report

Defendants shall use existing data at the Site including, but not limited to, data collected pursuant to the Site Removal Action and RFI to develop a Phase I Conceptual Site Model (CSM) of the Site. The purpose of this activity will be to ensure existing data are used to the maximum extent practicable in the development of the RI Work Plan.

Exposure assumptions developed in the Phase I CSM must be supported with data and must be consistent with Agency policy. For each exposure pathway, the release source, the transport media (e.g., surface water, air, etc.) and the exposure route (oral, inhalation, dermal) must be clearly delineated for both human and ecological receptors. Both present and reasonably anticipated future uses at the Site must be developed and presented in the CSM. The Human Health Evaluation Manual, Part A and the supplemental guidance entitled Standard Default Exposure Factors (OSWER Directive 9285.6-03) should be consulted in development of exposure assumptions. EPA referenced default exposure assumptions or default assumptions from other EPA-approved sources should be used when Site-specific data are not available.

Defendants shall include the exposure scenarios with a description of the assumptions made, data used, and a figure showing the CSM. If it is appropriate to use fate and transport models to estimate the exposure concentration at points spatially separate from monitoring points or media not sampled, these models shall be presented and discussed. Representative data must be utilized and the limitations and uncertainties associated with the models must be documented. The Exposure Assessment Section shall contain exposure concentrations typically based on the ninety-five (95) percent upper confidence limit on the arithmetic average or other appropriate statistical methods approved by EPA for deriving the exposure concentration.

The Phase I CSM Report shall also identify data gaps, if any exist, in the CSM that may require further evaluation during the RI process.

2. RI/FS Work Plan (2.3.1)

A Work Plan documenting the decisions and evaluations completed during the scoping process and in the Phase I CSM Report will be submitted to EPA for review and approval. The Work Plan should be developed in conjunction with the SAP and the Site health and safety plan, although each plan may be delivered under separate cover. The Work Plan will include a comprehensive description of the work to be performed, including the methodologies to be utilized, as well as a corresponding schedule for completion. In addition, the Work Plan must include the rationale for performing the required activities.

Specifically, the Work Plan will present a statement of the problem(s) and potential problem(s) posed by the Site and the objectives of the RI/FS. Furthermore, the plan will include a Site background summary setting forth the Site description including the geographic location of the Site, and to the extent possible, a description of the Site's physiography, hydrology, geology, demographics, ecological, cultural and natural resource features; a synopsis of the Site history and a description of previous responses that have been conducted at the Site by Defendants, local, state, federal, or private parties; and a summary of the existing data in terms of physical and chemical characteristics of the contaminants identified, and their distribution among the environmental media at the Site.

In addition, the plan will include a description of the Site management strategy approved by EPA during scoping, a preliminary identification of remedial alternatives, and data needs for evaluation of remedial alternatives. The plan will reflect coordination with treatability study requirements (see Tasks 1 and 4). It will include a process for and manner of identifying Federal and state ARARs (chemical-specific, location-specific and action-specific).

Finally, the Work Plan will include a detailed description of the tasks to be performed, information needed for each task, information to be produced during and at the conclusion of each task, and a description of the work products that will be submitted to EPA. This includes the deliverables set forth in the remainder of this SOW; a schedule for each of the required activities which is consistent with the RI/FS guidance; and a project management plan, including a data management plan (e.g., requirements for project management systems and software, minimum data requirements, data format and backup data management), monthly reports to EPA and meetings with presentations to EPA at the conclusion of each major phase of the RI/FS. The Defendants will refer to Appendix B of the RI/FS Guidance for a comprehensive description of the contents of the required Work Plan.

Because of the iterative nature of the RI/FS, additional data requirements and analyses may be identified throughout the process. The Defendants will submit a technical memorandum documenting the need for additional data, and identifying the DQOs whenever such requirements are identified. In any event, the Defendants are responsible for fulfilling additional data and analysis needs identified by EPA consistent with the general scope and objectives of this RI/FS.

3. Sampling and Analysis Plan (2.3.2)

Defendants will prepare a sampling and analysis plan (SAP) to ensure that sample collection and analytical activities are conducted in accordance with technically acceptable protocols and that the data meet DQOs. The SAP provides a mechanism for planning field activities and consists of a field sampling plan (FSP) and a quality assurance project plan (QAPP). The FSP will define in detail the sampling and data-gathering methods that will be used on the project. It will include sampling objectives, sample location and frequency, sampling equipment and procedures, and sample handling and analysis. The QAPP will describe the project objectives and organization, functional activities, and quality assurance and quality control (QA/QC) protocols that will be used to achieve the desired DQOs. The QAPP will be prepared in accordance with "EPA Requirements for Quality Assurance Project Plans (QA/R-5)" (EPA/240/B-01/003, March 2001) and "EPA Guidance for Quality Assurance Project Plans (QA/G-5)" (EPA/600/R-98/018, February 1998). The DQOs will at a minimum reflect use of analytic methods to identifying contamination and remediating contamination consistent with the levels for remedial action objectives identified in the proposed National Contingency Plan, pages 51425-26 and 51433 (December 21, 1988). In addition, the QAPP will address sampling procedures, sample custody, analytical procedures, and data reduction, validation, reporting and personnel qualifications. Field personnel should be available for EPA QA/QC training and orientation where applicable. Defendants will demonstrate, in advance to EPA's satisfaction, that each laboratory it

may use is qualified to conduct the proposed work. This includes use of methods and analytical protocols for the chemicals of concern in the media of interest within detection and quantification limits consistent with both QA/QC procedures and DQOs approved in the QAPP for the Site by EPA. Each laboratory must have and follow an approved QA program. If a laboratory not in the Contract Laboratory Program (CLP) is selected, methods consistent with CLP methods that would be used at this Site for the purposes proposed and QA/QC procedures approved by EPA will be used. The Defendants shall only use laboratories which have a documented Quality Assurance Program which complies with ANSI/ASQC E-4 1994, "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs." (American National Standard, January 5, 1995) and "EPA Requirements for Quality Management Plans (QA/R-2)" (EPA/240/B-01-002, March 2001) or equivalent documentation as determined by EPA. If the laboratory is not in the CLP program, a laboratory QA program must be submitted for EPA review and approval. EPA may require that Defendants submit detailed information to demonstrate that the laboratory is qualified to conduct the work, including information on personnel qualifications, equipment and material specifications. Defendants will provide assurances that EPA has access to laboratory personnel, equipment and records for sample collection, transportation and analysis.

4. Site Health and Safety Plan (2.3.3)

A health and safety plan will be prepared in conformance with the Defendants' health and safety program, and in compliance with OSHA regulations and protocols. The health and safety plan will include the 11 elements described in the RI/FS Guidance, such as a health and safety risk analysis, a description of monitoring and personal protective equipment, medical monitoring, and Site control. It should be noted that EPA does not "approve" Defendants' health and safety plan, but rather EPA reviews it to ensure that all necessary elements are included, and that the plan provides for the protection of human health and the environment.

TASK 2 - COMMUNITY RELATIONS

Although implementation of the community relations plan is EPA's responsibility, Defendants shall assist EPA by providing information regarding the Site's history, participating in public meetings, or by preparing fact sheets for distribution to the general public. EPA will make these materials available to all interested parties for comment and place them in the Administrative Record. (EPA is not required, however, to formally respond to significant comments except during the formal public comment period on the proposed plan.) At EPA's discretion, Defendants shall establish a community information repository at or near the Site, to house one copy of the Administrative Record. The extent of PRP involvement in community relations activities is left to the discretion of EPA. All PRP-conducted community relations activities related to these agreements will be subject to oversight by EPA.

In addition, Defendants shall prepare a plan (hereinafter referred to as the Technical Assistance Plan (TAP)), subject to EPA's approval, for providing and administering up to $150,000.00 of Defendants'

money to fund qualified citizen groups to hire technical advisors, independent from Defendants, to help interpret and comment on Site-related documents developed under this SOW and through the public participation period for the ROD. Within forty-five (45) days after the Effective Date of this Consent Decree, the Defendants shall submit the TAP to EPA. The TAP shall provide for an initial payment of up to $50,000 . The TAP may be renewed twice, in $50,000 increments, if EPA, in its sole discretion, determines that renewal is necessary to help interpret and comment on Site-related documents developed under this SOW and through the public participation period for the ROD.

As part of the TAP, Defendants must propose a method, including an application process and eligibility criteria, for awarding and administering the funds referenced above. Any eligible citizen group must be: 1) a representative group of individuals potentially affected by the Site, 2) incorporated as a nonprofit organization for the purposes of the Site or otherwise established as a charitable organization that operates within the geographical range of the Site and is already incorporated as a nonprofit organization, and 3) able to demonstrate its capability to adequately and responsibly manage any funds awarded.

Any group is ineligible if it is: 1) potentially responsible for contamination problems at the Site, 2) an academic institution, 3) a political subdivision, 4) a group whose ability to represent the interest of affected individuals might be limited as a result of receiving paid services from a Potentially Responsible Party ("PRP"), or 5) a group established or sustained by government entities, a Potentially Responsible Party, or any ineligible entity.

Funds may be awarded to only one qualified group at a time for purposes of this Consent Decree and SOW. In addition, at a minimum, the technical advisor must possess the following credentials: 1) demonstrated knowledge of hazardous or toxic wastes issues by proven work experience in such fields in excess of five (5) years; 2) a bachelor of science in a relevant discipline (e.g., biochemistry, toxicology, environmental sciences, engineering); 3) ability to translate technical information into terms understandable to lay persons; 4) experience in making technical presentations in a public meeting or hearing setting; and 5) demonstrated writing skills. The technical advisor may not be a party to or be associated with an organization that is a party to or a witness, including an expert witness, in any current or past legal proceeding adverse to Defendants. Any unobligated funds shall revert to Defendants upon the end of the public participation period for the ROD.

For purposes of resolving any disputes that may arise between Defendants, the technical advisor, and/or the selected citizen group concerning the administration and/or use of the funds under the TAP, Defendants shall, as part of their TAP, propose a method for resolution, which will include the use of binding arbitration. As part of the dispute resolution proposal, Defendants must provide the method for selecting a third-party arbitrator that allows for the selection of an arbitrator acceptable to all parties involved in the dispute. Additionally, the dispute resolution provision must require that before the services of an arbitrator are invoked, the parties must comply with the following procedures: 1) the party that raises a complaint must submit that complaint in writing to the party who is the subject of the

complaint; 2) the recipient of the complaint must provide the first party with a written response within fifteen (15) calendar days of receipt of the complaint; 3) the parties then have fifteen (15) calendar days to resolve the dispute; and 4) if the disagreement cannot be resolved at this level, then the services of a third-party arbitrator will be sought. The written decision of the arbitrator will be the final decision.

Subject to EPA's approval Defendants may hire a third party (hereinafter referred to as the TAP Coordinator) to coordinate and administer the TAP. However, any such TAP Coordinator must be approved by EPA. Defendants must demonstrate that the TAP Coordinator is qualified to perform this task. If the Defendants opt to hire a TAP Coordinator, they must submit in writing that person's name, title, and qualifications to EPA within fifteen (15) days of EPA's approval of the TAP. Additionally, the Defendants must designate within fifteen (15) days of EPA's approval of the TAP an outreach coordinator who will be responsive to the public's inquiries and questions about the Site, including information about the application process and administration of the TAP.

To the extent practicable, Defendants shall select the TAP recipient and administer the appropriate funds to such group by the date on which the Draft RI/FS Workplan is due to EPA.

In addition, Defendants shall prepare a plan (hereinafter referred to as the Community Advisory Group Plan (CAGP) for providing and administering funding necessary for the development and ongoing operations of a Community Advisory Group (CAG), and for providing meeting space and facilitators for the CAG for periodic meetings during the response activities conducted pursuant to this Consent Decree through the public participation period for the ROD. The CAG shall be established in a manner consistent with the attached CAG information from EPA's website. Within forty-five (45) days after the Effective Date of this Consent Decree, the Defendants shall submit the CAGP to EPA.

In addition to devising and administering the TAP and the CAG, other community relations responsibilities EPA may assign to the Defendants shall be specified in the community relations plan. The Defendants must provide EPA quarterly progress reports regarding the implementation of the TAP and the CAG. The progress reports may be completed as part of the monthly progress reports.

TASK 3 - SITE CHARACTERIZATION (RI/FS Guidance, Chapter 3)

As part of the RI, Defendants will perform the activities described in this task, including the preparation of a site characterization summary and RI report. The overall objective of site characterization is to describe areas of the Site that may pose a threat to human health or the environment. This is accomplished by first determining the Site's physiography, geology, and hydrology. Surface and subsurface pathways of migration will be defined. The Defendants will identify the sources of contamination and define the nature, extent, and volume of the sources of contamination, including their physical and chemical constituents as well as their concentrations at incremental locations to background in the affected media. The Defendants will also investigate the extent of migration of this contamination as well as its volume and any changes in its physical or chemical characteristics, to

provide for a comprehensive understanding of the nature and extent of contamination at the Site. Using this information, contaminant fate and transport is then determined and projected.

During this phase of the RI/FS, the Work Plan, SAP, and health and safety plan are implemented. Field data will be collected and analyzed to provide the information required to accomplish the objectives of the study. The Defendants will notify EPA at least two weeks in advance of the field work. Field work may include ecological field surveys, field lay out of sampling locations, excavation, installation of wells, initiating sampling, installation and calibration of equipment, pump tests, and initiation of analysis and other field investigation activities. The Defendants will demonstrate that the laboratory and type of laboratory analyses that will be utilized during site characterization meets the specific QA/QC requirements and the DQOS of the site investigation as specified in the SAP. Field activities are often iterative, and to satisfy the objectives of the RI/FS it may be necessary for the Defendants to supplement the work specified in the initial Work Plan. In addition to the deliverables below, Defendants will provide a monthly progress report and participate in meetings at major points in the RI/FS.

A. Field Investigation (3.2)

The field investigation includes the gathering of data to define Site physical and biological characteristics, sources of contamination, and the nature and extent of contamination at the Site. These activities will be performed by Defendants in accordance with the Work Plan and the SAP. At a minimum, these activities shall address the following:

1. Access

For all properties where access is required to conduct the field investigation in areas owned by or in possession of someone other than Defendant, Defendant shall obtain access in the manner described in the RI/FS agreement.

2. Implement and document field support activities (3.2.1)

Defendants will initiate field support activities following approval of the Work Plan and SAP. Field support activities may include obtaining access to the Site, scheduling, and procuring equipment, office space, laboratory services, and/or contractors. Defendants will notify EPA at least two weeks prior to initiating field support activities so that EPA may adequately schedule oversight tasks. Defendants will also notify EPA in writing upon completion of field support activities.

3. Investigate and define Site characteristics (3.2.2)

The Defendants will collect data on the characteristics of the Site in accordance with the Work Plan. This information will be ascertained through a combination of physical measurements, observations, and sampling efforts and will be utilized to refine the CSM. In defining the Site's physical characteristics Defendants will also obtain sufficient engineering data (such as pumping characteristics) for the projection of contaminant fate and transport, and development and screening of remedial action alternatives, including information to assess treatment technologies.

4. Define sources of contamination (3.2.3)

The Defendants will locate each source of contamination. For each location, the areal extent and depth of contamination will be determined by sampling in accordance with the Work Plan .

The Defendants shall conduct sufficient sampling to define the boundaries of the contaminant sources to the level established in the QAPP and DQOs.

Defining the source of contamination will include analyzing the potential for contaminant release (e.g., long term leaching from soil, transfer to air), contaminant mobility and persistence, and characteristics important for evaluating remedial actions, including information to assess treatment technologies.

5. Describe the nature and extent of contamination (3.2.4)

The Defendants will gather information to describe the nature and extent of contamination as a final step during the field investigation. To describe the nature and extent of contamination, the Defendants will utilize the information concerning Site physical and biological characteristics and sources of contamination to give a preliminary estimate of the contaminants that may have migrated. The Defendants will then implement any study program or modeling techniques identified in the Work Plan or SAP to quantify the concentration of contaminants in the various media at the Site. In addition, Defendants will gather data for calculations of contaminant fate and transport. This process will be continued until the area and depth of contamination are known to the level established in the QAPP and DQOs. Defendants will use this information to perform the Baseline Risk Assessment and to help determine aspects of the appropriate remedial action alternatives to be evaluated.

B. Data Analysis (3.4)

Evaluate Site characteristics (3.4.1)

The Defendants will analyze and evaluate the data to describe the: 1) Site physical and biological characteristics, 2) contaminant source characteristics, 3) nature and extent of contamination and 4) contaminant fate and transport. Results of the Site physical characteristics, source characteristics, and extent of contamination analyses will be used in the in the analysis of contaminant fate and transport. The fate and transport evaluation will include an analysis of the actual and potential magnitude of releases from the sources, the horizontal and vertical spread of contamination and the mobility and persistence of contaminants. Where modeling is appropriate, such models shall be identified to EPA in a technical memorandum prior to their use. All data and programming, including any proprietary programs, shall be made available to EPA together with a sensitivity analysis.

Defendants shall identify and address, in a manner approved by EPA, any data gaps that are needed to complete the baseline risk assessment. (See "Guidance for Data Usability in Risk Assessment - OSWER Directive # 9285.7-05 - October 1990.) Defendants will provide a detailed description of the statistical approach that will be used to estimate the relevant exposure point concentration (EPC) for the purposes of evaluating Site-related risks. Defendants shall perform an analysis using the current EPA default procedure requiring the calculation of the 95% upper confidence limit (UCL) of the arithmetic mean using the Land H-statistic (EPA, 1989). However, alternative approaches are available, including surface area weighting, jackknife estimations, and spatial bootstrapping (EPA, 1997), which may be considered as well.

The data analysis process shall also include any information relevant to Site characteristics necessary for evaluation of the need for remedial action in the baseline risk assessment and for the development and evaluation of remedial alternatives. Analysis of data collected during site characterization will meet the DQOs developed in the QAPP stated in the SAP (or revised during the RI).

C. Data Management Procedures (3.5)

Defendants will consistently document the quality and validity of field and laboratory data compiled during the RI.

1. Document field activities (3.5.1)

Information gathered during site characterization will be consistently documented and adequately recorded by Defendants in well-maintained field logs and laboratory reports. The documentation

method(s) shall be specified in the Work Plan and/or the SAP. Field logs shall be used to document observations, measurements, and significant events that have occurred during field activities. Laboratory reports shall document sample custody, analytical responsibility, analytical results, adherence to prescribed protocols, nonconformity events, corrective measures, and/or data deficiencies.

2. Maintain sample management and tracking (3.5.2; 3.5.3.)

Defendants will maintain field reports, sample shipment records analytical results, and QA/QC reports to ensure that only validated analytical data are reported and used in the evaluation of remedial alternatives. Analytical results developed under the Work Plan will not be included in any site characterization reports unless accompanied by or cross-referenced to a corresponding QA/QC report. In addition, Defendants will establish a data security system to safeguard chain-of custody forms and other project records to prevent loss, damage, or alteration of project documentation.

D. Site Characterization Deliverables (3.7)

The Defendants will prepare the preliminary site characterization summary and the remedial investigation report.

1. Preliminary Site Characterization Summary (3.7.2)

After completing field sampling and analysis, the Defendants will prepare a concise characterization summary. This summary will review the investigative activities that have taken place, and describe and display Site data documenting the location and characteristics of surface and subsurface features and contamination at the Site including the affected medium, location, physical state, concentration of contaminants, and quantity. In addition, the location, dimensions, physical condition and varying concentrations of each contaminant throughout each source and the extent of contaminant migration through each of the affected media will be documented. The site characterization summary will provide EPA with a preliminary reference for evaluating the risk assessment, and evaluating the development and screening of remedial alternatives and the refinement and identification of ARARs.

2. Remedial Investigation (RI) (3.7.3)

The Defendants will prepare and submit a draft RI report to EPA for review and approval. This report shall summarize results of field activities to characterize the Site, sources of contamination and the fate

and transport of contaminants. The Defendants will refer to the RI/FS Guidance for an outline of the report format and contents. Following comment by EPA, the Defendants will prepare a final RI report which satisfactorily addresses EPA's comments.

TASK 4 - TREATABILITY STUDIES (RI/FS Guidance, Chapter 5)

Treatability testing will be performed by the Defendants to assist in the detailed analysis of alternatives. In addition, if applicable, testing results and results and operating conditions will used in the detailed design of the selected remedial technology. The following activities will be performed by the Defendants.

A. Determination of Candidate Technologies and of the Need for Testing (5.2; 5.4)

The Defendants will identify in a technical memorandum, subject to EPA review and approval, candidate technologies for a treatability studies program during project planning (Task 1). The listing of candidate technologies will cover the range of technologies required for alternatives analysis (Task 6 a.) The specific data requirements for the testing program will be determined and refined during site characterization and the development and screening of remedial alternatives (Tasks 2 and 6, respectively).

1. Conduct literature survey and determine the need for treatability testing (5.2)

The Defendants will conduct a literature survey to gather information on performance, relative costs, applicability, removal efficiencies, operation and maintenance (O&M) requirements, and implementability of candidate technologies. If practical candidate technologies have not been sufficiently demonstrated, or cannot be adequately evaluated, or cannot be adequately evaluated for this Site on the basis of available information, treatability testing will be conducted. Where it is determined by EPA that treatability testing is required, and unless the Defendants can demonstrate to EPA's satisfaction that they are not needed, the Defendants will submit to EPA a Technical Memorandum on Steps and Data outlining the steps and data necessary to evaluate and initiate the treatability testing program.

2. Evaluate treatability studies (5.4)

Once a decision has been made to perform treatability studies, the Defendants and EPA will decide on the type of treatability testing to use (e.g., bench versus pilot). Because of the time

required to design, fabricate, and install pilot scale equipment as well as perform testing for various operating conditions, the decision to perform pilot testing should be made as early in the process as possible to minimize potential delays of the FS. To assure that a treatability testing program is completed on time, and with accurate results, the Defendants will either submit a separate treatability testing Work Plan or an amendment to the original Site Work Plan for EPA review and approval.

B. Treatability Testing and Deliverables (5.5; 5.6; 5.8)

The deliverables that are required, in addition to the memorandum identifying candidate technologies, where treatability testing is conducted include a Work Plan, a SAP, and a final treatability evaluation report. EPA may also require a treatability study and safety plan, where appropriate.

1. Treatability Testing Work Plan (5.5)

The Defendants will prepare a treatability testing Work Plan or amendment to the original Site Work Plan for EPA review and approval describing the Site background, remedial technology(ies) to be tested, test objectives, experimental procedures, treatability conditions to be tested, measurements of performance, analytical methods, data management and analysis, health and safety, and residual waste management. The DQOs for treatability testing should be documented as well. If pilot scale treatability testing is to be performed, the pilot-scale Work Plan will describe pilot plant installation and start-up, pilot plant operation and maintenance procedures, operating conditions to be tested, a sampling plan to determine pilot plant performance, and a detailed health and safety plan. If testing is to be performed off-Site, permitting requirements will be addressed.

2. Treatable study SAP (5.5)

If the original QAPP or FSP is not adequate for defining the activities to be performed during the treatability test, a separate treatability study SAP or amendment to the original Site SAP will be prepared by the Defendants for EPA review and approval. Task 1, Item C of this Statement of Work provides additional information on the requirements of the SAP.

3. Treatability study health and safety plan (5.5)

If the original health and safety plan is not adequate for defining the defining the activities to be performed during the treatment tests, a separate or amended health and safety plan will be

developed by the Defendants. Task 1, Item C of this statement of work provides additional information on the requirements of the health and safety plan. EPA does not "approve" the treatability study health and safety plan.

4. Treatability study evaluation report (5.6)

Following completion of treatability testing, the Defendants will analyze and interpret the testing results in a technical report to EPA. Depending on the sequences of activities, this report may be a part of the RI/FS report or a separate deliverable. The report will evaluate each technology's effectiveness, implementability, cost and actual results as compared with predicted results. The report will also evaluate full scale application of the technology, including a sensitivity analysis identifying the key parameters affecting full-scale operation.

TASK 5 - BASELINE RISK ASSESSMENT

The Defendants will provide a Baseline Risk Assessment (BRA) to EPA for the Site, consisting of a Human Health Risk Assessment and an Ecological Risk Assessment.

The Defendants shall prepare a BRA which identifies and characterizes the toxicity and effects of the hazardous substances present, describes contamination fate and transport, evaluates the potential for human exposure, and assesses the risk of potential impact or threats on human health. In addition, as a component of the BRA, the Defendants shall prepare an Ecological Risk Assessment which assesses the risk of potential impacts or threats to the ecology (including both flora and fauna). The BRA will provide EPA a basis for determining whether or not remedial action is necessary, a justification for performing any remedial action that may be required, and a risk basis for clean up goals.

Defendants shall develop the human health portion of the BRA in accordance with the Environmental Protection Agency's (EPA's) Interim Final Risk Assessment Guidance for Superfund (RAGS) - Volume I - Human Health Evaluation Manual (Part A) (December 1989), Development of Risk-Based Remediation Goals (Part B) (December 1991), and Standardized Planning, Reporting, and Review of Superfund Risk Assessments (Part D) (December 1997). These documents describe and illustrate the process of gathering and assessing human health risk information in addition to developing remediation goals. Other resources that Defendants should use when performing the BRA include: Exposure Factors Handbook (EPA/600/P-95/002Fa, August 1997), Land Use in the CERCLA Remedy

Selection Process, OSWER Directive NO. 9355.7-04, May 25, 1995; Soil Screening Guidance; Technical Background Document, 9355.4-17A, EPA/1501 R-95/128, May 1996, Soil Screening Guidance; User's Guide, 9355.4-3, April 1996; The Integrated Risk Information System (IRIS); the Health Effects Assessment Summary Tables (HEAST); and the Supplemental Guidance to RAGS Region 4 Bulletins-Human Risk Assessment (November 1995). Other resources include the RCRA Cleanup Reforms of 1999 (EPA/530/F-99-018, July 1999) and guidance provided in Coordination Between RCRA Corrective Action and Closure and CERCLA Site Activities (EPA, September, 1996).

Defendants shall provide a detailed description of risk evaluation methods contained in previously prepared work plans used in the assessments of potential risks to human health and the environment including activities conducted under the RFI that is being conducted pursuant to Defendants' RCRA Permit. EPA's memorandum of September 1996, encourages the coordination of the specific standards and administrative requirements for closure of RCRA regulated units with other cleanup activities, including those proposed under CERCLA. Therefore, EPA will consider the procedures developed during these previous Site-related investigations.

For preparing the ecological risk assessment, Defendants shall also utilize the Supplemental Guidance to RAGS; Region 4 Bulletins-Ecological Risk Assessment (November, 1995) and the Ecological Risk Assessment Guidance for Superfund Process for Design and Conducting Ecological Risk Assessments (June 1997). EPA shall identify other guidance for human health and ecological assessment as necessary.

A Draft Baseline Risk Assessment Report (for both Human Health and for Ecological Receptors) shall be submitted at the completion of site characterization and included in the Draft RI Report (see Task 3). Following comment by EPA, Defendants shall prepare a Final Baseline Risk Assessment Report that will be included in the Final RI Report.

A. Human Health Risk Assessment

The Human Health Risk Assessment process consists of the four components listed below. During the scoping of the work assignment, Defendants shall discuss with EPA the format of the BRA Report as well as any additional references to be used during the Human Health Risk Assessment.

1. Data Collection and Evaluation:

The Defendants shall review the information that is available on the hazardous substances present at the Site and shall identify the chemicals of potential concern (COPCs). The process of identifying COPCs should follow the guidance provided in Region 4's guidance and RAGS Part D. The data shall be tabulated according to the guidance provided in RAGS Part D. This portion of the BRA shall include a discussion of the rationale for the identification of the COPCs.

2. Exposure Assessment and Documentation:

The Defendants shall use data collected during the site characterization to refine actual and potential exposure points and pathways initially identified in the Phase I Conceptual Site Model Report. Exposure assumptions must be supported with data and must be consistent with EPA policy. For each exposure pathway, the release source, the transport media (e.g., ground water, surface water, air, etc.) and the exposure route (oral, inhalation, dermal) shall be clearly delineated in the CSM (RI/FS Guidance Figure 2-2). Both present and reasonably anticipated future uses at the Site must be developed and presented, using reasonable maximum exposure (RME)scenarios. The Human Health Evaluation Manual, Part A and the supplemental guidance entitled Standard Default Exposure Factors (OSWER Directive 9285.6-03) should be consulted in development of exposure assumptions. EPA referenced default exposure assumptions or default assumptions from other approved sources should be used when Site-specific data are not available. Defendants shall include, within the BRA, the exposure scenarios with a description of the assumptions made, data used, and a figure showing the CSM . If it is appropriate to use fate and transport models to estimate the exposure concentration at points spatially separate from monitoring points or media not sampled, these models shall be presented and discussed. Representative data shall be used and the limitations and uncertainties associated with the models shall be documented. The Exposure Assessment Section in the BRA shall contain exposure concentrations typically based on the 95 percent upper confidence limit on the arithmetic average, as well as other appropriate statistical methods for deriving the exposure concentration approved by EPA. The exposure concentration shall be used with the exposure assumptions to determine chemical-specific intake levels for each exposure scenario.

3. Toxicity Assessment and Documentation:

The Defendants shall use the information in IRIS, HEAST, and if needed, other data bases and published information sources as discussed in the Region 4 guidance, to provide a toxicity

assessment of the COPCs. Consult RAGS Part D and Region 4's guidance for specific guidance on what information is needed. This assessment shall include the types of adverse health effects associated with chemical exposures (including potential carcinogenicity or the toxic effect observed in deriving the Reference Dose (RfD)), the relationships between magnitude of exposures and adverse effects, and the related uncertainties of contaminant toxicity (e.g., the weight of evidence for a chemical's carcinogenicity or the degree of confidence in the RfD).

4. Risk Characterization:

Considering previous assessments of the Site, Defendants shall integrate the information developed during the exposure and toxicity assessments to derive risk-based, Site-specific, preliminary remedial goals (PRGs). The PRG values will be developed by combining all relevant exposure pathways for a particular receptor and rearranging the standard equations provided by EPA (1992; 1995), solving for the concentration term. The risk characterization must identify the uncertainties associated with contaminants, toxicities, and exposure assumptions and comply with other guidance provided in the February 1995 Guidance for Risk Characterization from EPA's Science Policy Council. Consult RAGS Part D and Region 4's guidance for specific guidance on what information is needed. Statistical approximations of exposure concentrations using methods approved by EPA will be compared to the Site-specific PRGs.

The human health risk assessment may also include a "central tendency" analysis for the contaminants of concern (COCs) that are identified. This analysis can be used as information to provide perspective for the risk manager and compliance with Agency guidance. Any risk values other than those representing the RME (reasonable maximum exposure) exposure (i.e., central tendency) should be placed in the uncertainty sub-section of the risk characterization section of the BRA. The Supplemental Guidance to RAGS: Region 4 Bulletins (November, 1995) should be consulted for further guidance on central tendency issues.

B. Ecological Risk Assessment

In addition to the human health component of the BRA, Defendants shall evaluate and assess the risk to the ecological receptors posed by Site contaminants. The primary Agency guidance that must be followed in evaluating the Site for ecological risks are: Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments (EPA 540-R-97-006,

June 2, 1997), known as ERAGs, and Region 4's Regional Guidance, Supplemental Guidance to RAGS: Region 4 Bulletins, Ecological Risk Assessment.

The Screening-Level Ecological Risk Assessment (Steps 1 and 2) is the preliminary phase of the risk assessment process which is used to identify contaminants (chemicals of potential concern [COPCs]) that warrant further consideration in the Baseline Risk Assessment Problem Formulation (Step 3). The Ecological Risk Assessment is composed of the following tasks:

1. Screening-Level Ecological Risk Assessment (Steps 1)

Defendants shall review the existing information (Preliminary Assessment, Site Investigation, Expanded Site Investigation, and/or additional information), describe the ecological setting (utilizing the Ecological Checklist found in Appendix A of the ERAGS Process document) and identify contaminants known or suspected to exist at the Site.

2. Screening-Level Exposure Estimate and Risk Calculation

Defendants shall compare the maximum concentrations present in each media to Region 4 Ecological Screening Values and Screening Hazard Quotients. Three tables should developed for each media to be included in the screening assessment: 1) a list of contaminants whose maximum concentration exceed the Ecological Screening Values, 2) a list of contaminants whose maximum concentration does not exceed the screening values but whose Practical Quantification Limit exceeds the Ecological Screening Values, and 3) a list of contaminants for which there are no screening values. The document containing these first two steps of the ERA process will be submitted to the Agency for review and approval. If the screening assessment demonstrates the potential for unacceptable risks to ecological receptors, then the ERA process will continue with the following steps.

3. Baseline Risk Assessment Problem Formulation

Defendants will develop the problem formulation by refining the ecological chemicals of preliminary concern; further characterizing ecological effects of contaminants; reviewing and refining information on contaminant fate and transport, complete exposure pathways, and ecosystems potentially at risk; selecting assessment endpoints; and developing a conceptual model with working hypotheses or questions that the site investigation will address. The document containing this step shall be submitted to the Agency for review and approval.

4. Study Design and Data Quality Objective Process

Defendants shall develop a study design defining the measurement endpoints, data quality objectives and statistical considerations, methods of analysis; and a work plan and sampling and analysis plan for the ecological investigation outlining the data that will collected during the remedial investigation and the risk assessment methods which be used in interpreting the data. This document shall be submitted to the Agency for review and approval.

5. Field Verification of Sampling Design

Defendants shall verify the field collection methods to assure the implementability of the sampling plan. A document describing this verification procedure and any suggested modifications of the study design, work plan, or sampling and analysis plan shall be submitted to the Agency for review and approval.

6. Site Investigation and Analysis Phase

Defendants shall conduct the site investigation to collect the data to be used in the analysis phase as described in the Work Plan and the Sampling and Analysis Plan. Any deviation from the work plan shall be documented and submitted to the Agency for review and approval.

7. Risk Characterization

Defendants shall develop the Risk Characterization integrating the results of the exposure profile and exposure-response analyses. The result of this characterization will determine if there are unacceptable risks posed to ecological receptors by Site-related contaminants. If there are unacceptable risks, contaminant levels protective of ecological receptors should be determined and reported as remedial goal options (RGOs). A document containing the Risk Characterization and the RGO development shall be submitted to the Agency for review and approval.

8. Risk Management

Defendants shall address the ecological impacts of the remedial options in the Feasibility Study. This document shall be submitted to the Agency for review and approval.

C. Remedial Goal Options:

The BRA shall include a section that outlines the Remedial Goal Options (RGOs) for the chemicals and media of concern that are protective of human health, the ecology and ground water. This section should include both ARARs and health-based cleanup goals. This section should contain a table with media cleanup levels for each chemical that contributes to a pathway that exceeds a $1x10^{-4}$ risk (or what ever risk level is chosen as the remediation trigger by the risk manager) or a HI of 1or greater or exceeds a state or federal chemical-specific ARAR for each scenario evaluated in the BRA. Chemicals need not be included if their individual carcinogenic risk contribution to a pathway is less than $1x10^{-6}$ or their noncarcinogenic HQ is less than 0.1. For the human health risk assessment, the table should include the $1x10^{-4}$, $1x10^{-5}$, and $1x10^{-6}$ risk levels for each chemical, media and scenario (land use) and the HQ 0.1, 1 and 3 levels as well as any chemical-specific ARAR values (state and federal). The values should be developed by combining the exposure levels to each chemical by a receptor from all appropriate routes of exposure (i.e. inhalation, ingestion and dermal) within a pathway and rearranging the Site-specific average-dose equations used in the BRA to solve for the concentration term. The resulting table should present one set of RGOs for each media and each land use (e.g., residential (child and adult) and industrial). Ecological RGOs should be developed at No Observable Adverse Effects Level (NOAEL) and Lowest Observable Adverse Effects Level (LOAEL) protection levels for each assessment endpoint.

The purpose of developing RGOs is to provide the RPM with the maximum risk-related media level options on which to develop remediation aspects of the Feasibility Study and Proposed Plan. RAGS Part B is not appropriate for the development of RGOs since Site-specific exposure information is available at this stage in the risk assessment process. These Site-specific RGOs replace the generic PRGs in providing the final risk-based guidance for remedial action. The results of the ecological risk assessment should be the identification of remediation goals for the ecological COCs that would be protective for the receptors. These remediation goal options should be presented for the relevant environmental media.

D. Report Preparation

The BRA report shall be submitted in accordance with the RI/FS agreement.

The BRA Report shall include a comprehensive description of the four components of the Human Health Risk Assessment, and shall follow the principles established in the risk

assessment guidance documents. A discussion of sources of uncertainty, data gaps, incomplete toxicity information, and modeling characteristics must be included. Defendants shall refer to page 9-4 of the Human Health Evaluation manual for an outline of the report format. The Baseline Risk Assessment Report shall include an environmental assessment that evaluates the environmental risk posed by the Site contaminants of concern. The report shall be revised, as necessary, based on EPA's comments and submitted to EPA for approval.

TASK 6 - DEVELOPMENT AND SCREENING OF REMEDIAL ALTERNATIVES (RI/FS Guidance, Chapter 4)

The development and screening of remedial alternatives shall be performed in order to develop an appropriate range of waste management options that will be evaluated. This range of alternatives should include as appropriate, options in which treatment is used to reduce the toxicity, mobility, or volume of wastes, but varying in the types of treatment, the amount treated, and the manner in which long-term residuals or untreated wastes are managed; options involving containment with little or no treatment; options involving both treatment and containment; removal; and a no-action alternative. The following activities will be performed as a function of the development and screening of remedial alternatives.

A. Development and Screening of Remedial Alternatives (4.2)

Defendants will begin to develop and evaluate a range of appropriate waste management options that, at a minimum, ensure protection of human health and the environment, concurrent with the RI site characterization task.

1. Refine and document remedial action objectives (4.2.1)

Based on the Baseline Risk Assessment, Defendants will review and, if necessary, modify the Site-specific remedial action objectives, especially the PRGs, that will be prepared by Defendants subject to approval by EPA. The revised PRGs will be documented in a technical memorandum that will be approved by EPA. These modified PRGs will specify the contaminants and media of interest, exposure pathways and receptors, and an acceptable contaminant level or range of levels (at particular locations for each exposure route).

2. Develop general response action (4.2.2)

Defendants will develop general actions for each medium of interest defining containment, treatment, excavation, pumping, or other actions, singly or in combination, to satisfy the remedial action objectives.

3. Identify areas or volumes of media (4.2.3)

Defendants will identify areas or volumes of media to which general response actions may apply, taking into account requirements for protectiveness as identified in the remedial action objectives. The chemical and physical characterization of the Site will also be taken into account.

4. Identify, screen, and document remedial technologies (4.2.4; 4.2.5)

If deemed necessary by EPA, Defendants will identify and evaluate technologies applicable to each general response action to eliminate those that cannot be implemented at the Site. General response actions will be refined to specify remedial technology types. Technology process options for each of the technology types will be identified either concurrent with the identification of technology types, or following the screening of the considered technology types. Process options will be evaluated on the basis of effectiveness, implementability, and cost factors to select and retain one or, if necessary, more representative processes for each technology type. The technology types and process options will be summarized for inclusion in a technical memorandum. The reasons for eliminating alternatives must be specified.

5. Assemble and document alternatives (4.2.6)

The Defendants will assemble selected representative technologies into alternatives for each affected medium or operable unit. Together, all of the alternatives will represent a range of treatment and containment combinations that will address either the Site or the operable unit as a whole. A summary of the assembled alternatives and their related action-specific ARARS will be prepared by the Defendants for inclusion in a technical memorandum. The reasons for eliminating alternatives during the preliminary screening process must be specified.

6. Refine alternatives

If deemed necessary by EPA, Defendants will refine the remedial alternatives to identify contaminant volume addressed by the proposed process and sizing of critical unit operations as

necessary. Sufficient information will be collected for an adequate comparison of alternatives. PRGs for each chemical in each medium will also be modified as necessary to incorporate any new risk assessment information presented in the Baseline Risk Assessment Report. Additionally, action-specific ARARs will be updated as the remedial alternatives are refined.

7. Conduct and document screening evaluation of each alternative (4.3)

Defendants may perform a final screening process based on short and long term aspects of effectiveness, implementability, and relative cost. Generally, this screening process is only necessary when there are many feasible alternatives available for detailed analysis. If necessary, the screening of alternatives will be conducted to assure that only the alternatives with the most favorable composite evaluation of all factors are retained for further analysis. As appropriate, the screening will preserve the range of treatment and containment alternatives that was initially developed. The range of remaining alternatives will include options that use treatment technologies and permanent solutions to the maximum extent practicable.

B. Alternatives Development and Screening Deliverables (4.5)

Defendants will prepare a technical memorandum summarizing the work performed in and the results of each task above, including an alternatives array summary and identifying the action-specific ARARs for the alternatives that remain after screening. These will be modified by Defendants if required by EPA's comments to assure identification of a complete and appropriate range of viable alternatives to be considered in the detailed analysis. This deliverable will document the methods, rationale, and results of the alternatives screening process.

TASK 7 - DETAILED ANALYSIS OF REMEDIAL ALTERNATIVES (RI/FS Guidance, Chapter 6)

Defendants will conduct a detailed analysis of remedial alternatives to provide EPA with the information needed to allow for the selection of a Site remedy. This analysis is the final task to be performed by Defendants during the FS.

A. Detailed Analysis of Alternatives (6.2)

Defendants will conduct a detailed analysis of alternatives that will consist of an analysis of each option against a set of nine evaluation criteria and a comparative analysis of all options using the same evaluation criteria as a basis for comparison.

1. Apply nine criteria and document analysis (6.2.1 - 6.2.4)

Defendants will apply nine evaluation criteria to the assembled remedial alternatives to ensure that the selected remedial alternative will be protective of human health and the environment; will be in compliance with, or include a waiver of, ARARS; will be cost-effective; will utilize permanent solutions and alternative treatment technologies, or resource recovery technologies, to the maximum extent practicable; and will address the statutory preference for treatment as a principal element. The evaluation criteria include: 1) overall protection of human health and the environment; 2) compliance with ARARs; 3) long-term effectiveness and permanence; 4) reduction of toxicity, mobility, or volume; 5) short-term effectiveness; 6) implementability; 7) cost; 8) state (or support agency) acceptance; and 9) community acceptance. (Note: criteria 8 and 9 are considered after the RI/FS report has been released to the general public.) For each alternative the Defendants should provide: 1) a description of the alternative that outlines the waste management strategy involved and identifies the key ARARs associated which each alternative, and 2) a discussion of the individual criterion assessment. If the Defendants do not have direct input on criteria 8 (state (or support agency) acceptance) and 9 (community acceptance), these will be addressed by EPA.

2. Compare alternatives against each other and document the comparison of alternatives (6.2.5; 6.2.6)

The Defendants will perform a comparative analysis between the remedial alternatives. That is, each alternative will be compared against the others using the evaluation criteria as a basis of comparison. Identification and selection of the preferred alternative are reserved by EPA. The Defendants will prepare a technical memorandum summarizing the results of the comparative analysis.

B. Feasibility Study Report (6.5)

Defendants will prepare a draft FS report for EPA review and comment. This report, as ultimately adopted or amended by EPA, will provide a basis for EPA's remedy selection and will document the development and analysis of remedial alternatives. Defendants will refer to the RI/FS Guidance for an

outline of the report format and the required report content. Defendants will prepare a final FS report that incorporates any amendments by EPA and satisfactorily addresses EPA's comments concerning the draft FS report.

SUMMARY OF MAJOR DELIVERABLES[1]

TASK/DELIVERABLE	MANAGEMENT CATEGORY
TASK 1 SCOPING	
- Technical Memorandum on Site-Specific Objectives and General Management Approach	Review and Approve
- Technical Memorandum on Preliminary Remedial Action Objectives and Alternatives	Review and Approve
- Phase I Conceptual Site Model Report	Review and Approve
- RI/FS Work Plan	Review and Approve
- Sampling and Analysis Plan (SAP)	Review and Approve
- Site Health and Safety Plan	Review and Comment
TASK 2 - COMMUNITY RELATIONS	
- Technical Assistance Plan	Review and Approve
- Community Advisory Group Plan	Review and Approve
TASK 3 SITE CHARACTERIZATION	
- Technical Memorandum on Modeling of Site Characteristics (where appropriate)	Review and Approve
- Preliminary Site Characterization Summary	Review and Comment
- Draft Remedial Investigation (RI) Report	Review and Approve

[1] See RI/FS agreement for additional reporting requirements and further instructions on submittal of deliverables.

TASK 4 TREATABILITY STUDIES

- Technical Memorandum Identifying Candidate Technologies — Review and Approve
- Technical Memorandum on Steps and Data — Review and Comment

- Treatability Testing Work Plan (or amendment to original) — Review and Approve
- Treatability Study SAP (or amendment to original) — Review and Approve
- Treatability Study Site Health and Safety Plan (or amendment to original) — Review and Comment
- Treatability Study Evaluation Report — Review and Approve

TASK 5 BASELINE RISK ASSESSMENT

- Preliminary Screening-Level Ecological Risk Assessment, Exposure Estimate and Risk Calculation (Steps 1 and 2) — Review and Approve
- Baseline Ecological Risk Assessment Problem Formulation (Step 3) — Review and Approve
- Ecological Study Design and Data Quality Objectives (Step 4) — Review and Approve
- Ecological Field Verification of Sampling Design (Step 5) — Review and Approve
- Deviations from Work Plan for Site Investigation and Analysis (Step 6) — Review and Approve
- Ecological Risk Characterization and Remedial Goal Options (Step 7) — Review and Approve
- Draft Baseline Risk Assessment Report — Review and Approve
- Final Baseline Risk Assessment Report — Review and Approve

TASK 6 DEVELOPMENT AND SCREENING OF REMEDIAL ALTERNATIVES

- Technical Memorandum Documenting Revised Remedial Action Objectives — Review and Approve
- Technical Memorandum on Remedial Technologies, Alternatives and Screening — Review and Approve

TASK 7 DETAILED ANALYSIS OF REMEDIAL ALTERNATIVES

- Technical Memorandum Summarizing Results of Comparative Analysis of Alternatives — Review and Approve
- Draft Feasibility Study (FS) Report — Review and Approve

REFERENCES FOR CITATION

The following list, although not comprehensive, comprises many of the regulations and guidance documents that apply to the RI/FS process:

1. The (revised) National Contingency Plan
2. "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, " U.S. EPA, Office of Emergency and Remedial Response, October 1988, OSWER Directive No. 9355.3-01
3. "Interim Guidance on Potentially Responsible Party Participation in Remedial Investigation and Feasibility Studies," U.S. EPA, Office of Waste Programs Enforcement, Appendix A to OSWER Directive No. 9355.3-01.
4. "Guidance on Oversight of Potentially Responsible Party Remedial Investigations and Feasibility Studies, Volume I" U.S. EPA, Office of Waste Programs Enforcement, July 1, 1991, OSWER Directive No. 9835.1(c).
5. “Guidance on Oversight of Potentially Responsible Party Remedial Investigations and Feasibility Studies, Volume II” U.S. EPA, Office Of Waste Programs Enforcement, July 1, 1991, OSWER Directive No. 9835.1(d).
6. "A Compendium of Superfund Field Operations Methods," Two Volumes, U.S. EPA,. Office of Emergency and Remedial Response, EPA/540/P-87/001a, August 1987, OSWER Directive No. 9355.0-14.

7. “Guidance for the Data Quality Objectives Process (QA-G-4),” (EPA/500/R-96/055, August 2000).
8. “Guidance for the Data Quality Objectives Process for Hazardous Waste Sites (QA/G-4HW),” (EPA/600/R-00/007, January 2000).
9. “Guidance for the Preparation of Standard Operating Procedures (QA-G-6),” (EPA/240/B-01/004, March 2001).
10. “EPA Requirements for Quality Management Plans (QA/R-2),” (EPA/240/B-01/002, March 2001).
11. “EPA Requirements for Quality Assurance Project Plans (QA/R-5),” (EPA/240/B-01/003, March 2001).
12. “Guidance for Quality Assurance Project Plans (QA/G-5),” (EPA/600/R-98/018, February 1998).
13. "Users Guide to the EPA Contract Laboratory," U.S. EPA, Sample Management Office, January 1991, OSWER Directive No. 9240.0-01D.
14. "Interim Guidance with Applicable or Relevant and Appropriate Requirements,' U.S. EPA, OFFICE of Emergency and Remedial Response, July 9, 1987, OSWER Directive No. 9234.0-05.
15. "CERCLA Compliance with Other Laws Manual," Two Volumes, U.S. EPA, Office of Emergency and Remedial Response, August 1988 (draft), OSWER Directive No. 9234.1-01 and -02.
16. "Guidance on Remedial Actions for Contaminated Ground Water at Superfund Sites," U.S." U.S. EPA, Office of Emergency and Remedial Response, (draft), OSWER Directive No. 9283.1-2.
17. "Draft Guidance on Superfund Decision Documents," U.S. EPA, Office of Emergency and Remedial Response, March 1988, OSWER Directive No. 9355.- 02
18. "Risk Assessment Guidance for Superfund - Volume I Human Health Evaluation Manual (Part A), EPA/540/1-89/002
19. "Risk Assessment Guidance for Superfund - Volume I Human Health Evaluation Manual (Part B, Development of Risk-based Preliminary Remediation Goals), EPA/540/R-92/003
20. "Risk Assessment Guidance for Superfund - Volume I Human Health Evaluation Manual (Part D, Standardized Planning, Reporting, and Review of Superfund Risk Assessments), EPA 540-R-97-033
21. “Ecological Risk Assessment Guidance for Superfund: Process for Designing & Conducting Ecological Risk Assessments,” U.S. EPA, OSWER Directive No. 9285.7-25, February 1997.
22. "Guidance for Data Usability in Risk Assessment," October, 1990, EPA/540/G-90/008

23. "Performance of Risk Assessments in Remedial Investigation/Feasibility Studies (RI/FSs) Conducted by Potentially Responsible Parties (PRPs)," August 28, 1990, OSWER Directive No.9835.15.
24. "Supplemental Guidance on Performing Risk Assessment in Remedial Investigation/ Feasibility Studies (RI/FSs) Conducted by Potentially Responsible Parties (PRPs)," July 2, 1991, OSWER Directive No. 9835.15(a).
25. "Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions," April 22, 1991, OSWER Directive No. 9355.0-30.
26. "Health and Safety Requirements of Employees Employed in Field Activities," U.S. EPA, Office of Emergency and Remedial Response, July 12, 1981, EPA Order No. 1440.2.
27. OSHA Regulations in 29 CFR 1910.120 (Federal Register 45654, December 19, 1986).
28. "Interim Guidance on Administrative Records for Selection of CERCLA Response Actions," U.S. EPA, Office of Waste Programs Enforcement, March 1,1989, OSWER Directive No. 9833.3A.
29. "Community Relations in Superfund: A Handbook," U.S. EPA, Office of Emergency and Remedial Response, June 1988, OSWER Directive No. 9230.0#3B.
30. "Community Relations During Enforcement Activities And Development of the Administrative Record," U.S. EPA, Office of Programs Enforcement, November 1988, OSWER Directive No. 9836.0-1a.
31. Coordination Between RCRA Corrective Action and Closure and CERCLA Site Activities (EPA, September, 1996)
32. Exposure Factors Handbook (EPA/600/P-95/002Fa, August 1997)
33. Land Use in the CERCLA Remedy Selection Process, OSWER Directive NO. 9355.7-04, May 25, 1995
34. Soil Screening Guidance; Technical Background Document, 9355.4-17A, EPA/1501 R-95/128, May 1996
35. Soil Screening Guidance; User's Guide, 9355.4-3, April 1996
36. Supplemental Guidance to RAGS Region 4 Bulletins-Human Risk Assessment (November 1995)
37. RCRA Cleanup Reforms of 1999 (EPA/530/F-99-018, July 1999)
38. Guide for Conducting Treatability Studies Under CERCLA, Final. U.S. EPA, Office of Solid Waste and Emergency Response, EPA/540/R-92/071a, October 1992.
39. Environmental Investigations Standard Operating Procedures and Quality Assurance Manual (EISOPQAM), Enforcement and Investigations Branch, US-EPA, Region 4, SESD, Athens, Georgia, May 1996 with subsequent revisions.

40. Guide to Management of Investigative-Derived Wastes, U.S. EPA, Office of Solid Waste and Emergency Response, Publication 9345.3-03FS, January 1992.